



# Idaho Power

## RAPID RIVER FISH HATCHERY

**1984 Chinook Salmon  
Brood Year Report**



**By**

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## ABSTRACT

Operation of the adult trap began on April 27 and continued through September 10, 1984. Between May 21 and July 30, a total of 2,356 spring chinook were collected in the trap. This total was comprised of 1,705 adults and 651 jacks, with an age class breakdown of 27.6% three year olds, 57.3% four year olds, and 15.1% five year olds. Sex ratio of adult fish was 47.4% male and 52.6% female.

Prespawning mortality, including trap mortalities, totaled 50 males and 75 females, or 7.3% of the adult count. Autopsies revealed 28% of these fish to have apparent signs of bacterial kidney disease. Spawning operations began on August 8 and continued through September 14, 1984. A total of 821 females were spawned, yielding approximately 3,125,911 eggs. Survival to eye-up and swim-up was 82.1% and 98.7%, respectively.

A total of 2,570,199 swim-up fry were transferred to the raceways for early rearing. Mortality during this phase of rearing totaled 10,558 fry or 6.5%.

In early June, 2.6 million fry were transferred to the final rearing ponds. Fish health was poor during this period, with mortality totaling 715,000 fish.

Prior to smolt release, 309,481 fish received coded wire tags, and 89,446 fish were freeze branded for research purposes. Based on population estimates, a total of 1,734,688 smolts were released from Rapid River Hatchery in 1986, with 1,594,688 being released directly into Rapid River and 140,000 released into the Snake River below Hells Canyon Dam.

A total of 129,000 lbs. (58,513.4 kg) of feed was used to produce 79,486 lbs. (36,054.2 kg) of fish, for an overall feed conversion of 1.62:1. Total feed cost for the 1984 brood year was \$57,081.73.

There were 112 adult spring chinook and 2 jacks trapped at Red River between July 10 and September 1, 1984. Twenty-nine adults and two Jacks were released upstream from the weir to spawn naturally. The remainder were hauled to Kamiah for spawning. A total of 49 Red River females were spawned, yielding approximately 217,181 eggs. Average fecundity was 4,276 eggs per female. These eggs and the resulting fry were held at Rapid River until June 26, when the fry were transferred to Red River pond. A total of 136,800 smolts were released from Red River pond at a mean size of 30/lb. (66.1/kg).

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## INTRODUCTION

Rapid River Hatchery was constructed in 1964 by Idaho Power Company as compensation for losses of chinook salmon (Oncorhynchus tshawytscha) resulting from the construction of Brownlee, Oxbow, and Hells Canyon dams on the Snake River. This mitigation, as required by the Federal Energy Regulatory Commission, dictated that Idaho Power transplant this run of chinook from the Snake River to the Salmon River drainage and provide funds for the production of three million spring chinook smolts annually. These fish are for release into Rapid River and the Snake River below Hells Canyon Dam.

Since 1984, Rapid River Hatchery has also been responsible for the operation of the weir at Red River and the production of Red River spring chinook. Funding for this program is made available through the U.S. Forest Service, National Marine Fisheries Service, and the Idaho Department of Fish and Game.

## LOCATION

Rapid River Hatchery is located in Idaho County, approximately seven miles (11.2 km) southwest of the community of Riggins, on Rapid River, a tributary to the Little Salmon River. With operating funds provided by Idaho Power Company, Rapid River Hatchery is staffed and operated by the Idaho Department of Fish and Game (IDFG).

## OBJECTIVES

The objectives of Rapid River Hatchery are:

1. To produce three million spring chinook smolts at an average size of 15 to 25 per pound (33.1 to 54.1 per kg) for release into Rapid River and the Snake River below Hells Canyon Dam.
2. To trap and spawn adult salmon returning to Rapid River.
3. To evaluate various strategies and techniques for rearing spring chinook salmon.
4. To collect eggs in excess of hatchery needs for distribution to other projects statewide.

## FISH REARING FACILITIES

The fish rearing facilities at Rapid River Hatchery consist of 48 double-stack Heath incubator trays, 12 outdoor concrete raceways (6'x 90'; 1.82 m x 27.3 m), two earthen rearing ponds, two earthen adult

holding ponds, and one concrete adult holding pond (80' x 25'; 24.3 m x 7.6 m). Capacities for each of these containers are presented in Table 1.

The adult trapping facility, located on Rapid River approximately 1.5 miles (2.4 km) downstream from the hatchery, is equipped with a permanent wooden velocity barrier, a three-step fish ladder, and a two-stage trap. Adult salmon are transferred from the trap to a 1,000-gallon tank truck for transport to the hatchery by means of an Alaska Steep Pass ladder and a 500-gallon bucket operated by an overhead hoist.

### **WATER SUPPLY**

From its origin in Adams County, Rapid River flows through a pristine canyon before reaching the hatchery. Under inclusion in the Wild and Scenic Rivers Act, the Rapid River drainage has not been subjected to perturbations such as logging and roading, and consequently, provides an excellent water source for rearing chinook. Results of water quality analysis (Table 2), conducted by Ford Chemical Lab of Salt Lake City, Utah, fall well within the suggested range for optimal fish health as described by Piper et al. (1982).

Water for hatchery operation is obtained from Rapid River through one 30" (76.2 cm) and one 24" (66 cm) pipeline. A 5' (1.5 m) wooden diversion dam provides the necessary hydraulic head to supply the hatchery with approximately 30 cubic feet per second (cfs) of water. Except for the incubators, all systems operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 7.5 hp electric pumps. A gasoline-operated pump and a filter bed system provide backup water should the electric pumps fail.

### **STAFFING**

The hatchery staff consists of a Hatchery Superintendent III, a Hatchery Superintendent I, and a Fish Culturist. In addition to the permanent staff, funding is provided for one eight-month and three three-month seasonal employees. Housing accommodations include three residences for the permanent staff and a mobile home for seasonal employees. Permanent staff members during this report period included: Tom Levendofsky (Supt. III), John Thorpe (Supt. I), Pat Chapman (Supt. I), Paul Abbott (Supt. I), John Stevens (Fish Culturist), Gary Bertellotti (Fish Culturist), and Rick Lowell (Fish Culturist).

Table 1. Carrying capacity of all systems at Rapid River Hatchery.

Container	Volume	Carrying capacity
Heath incubators	768 trays	7.7 million eggs
Raceways	1,890 ft <sup>3</sup> ea.	430,000 fry ea.
Rearing pond 1	64,000 ft <sup>3</sup>	1 million smolts
Rearing pond 2	96,000 ft <sup>3</sup>	2 million smolts
Adult pond 1	21,000 ft <sup>3</sup>	3,000 adults
Adult pond 2	70,000 ft <sup>3</sup>	6,000 adults
Cement pond	12,000 ft <sup>3</sup>	1,000 adults

Table 2. Comparison of observed and suggested water quality parameters.

Parameter	Suggested range	Observed
Alkalinity as CaCO <sub>3</sub>	10 - 400	62.0
Bicarbonate as HCO <sub>3</sub>	75 - 100	75.6
Calcium as Ca	4 - 160	23.2
Dissolved oxygen	5.0 - saturation	13.0
Iron as Fe	0 - 0.15	0.069
Magnesium	needed as buffer	3.84
Nitrate as NO <sub>3</sub> -N	0 - 3	0.15
Phosphate as PO <sub>4</sub> -P	0.01 - 3.0	0.03
pH	6.5 - 8.0	7.3
Total hardness as CaCO <sub>3</sub>	10 - 400	74.0



## FISH PRODUCTION

### Adult Collection

Operation of the adult trap began on April 27 and continued through September 10, 1984. A total of 2,356 spring chinook were collected between May 21 and July 30. The peak of the run occurred during the week of July 8 when 785 fish were captured (Fig. 1). Age class determination based on length frequency data (Fig. 2) indicate the run was composed of 27.6% (651) three year olds, 57.3% (1,349) four year olds, and 15.1% (356) five year olds. Sex ratio of adult fish was 47.4% (809) male and 52.6% (896) female.

Nearly 15% of the chinook collected this season were injured prior to arrival at the trap. While the majority (65.8) of these injuries were emboli resulting from gas supersaturation, a number of gill net scars and gaff wounds were also observed.

A total of 45 coded wire tags (CWT) were recovered from fish in 1984. Except for one jack from a 1983 release in the Snake River, all tag returns were associated with a vibrio vaccination program conducted on 1979 and 1980 brood presmolts. Returns on control groups appear slightly higher than test groups; however, the percent return of marked fish is significantly lower in all categories than expected (Table 3). One additional year will be necessary to recover all CWT and fully evaluate these data.

### Inventory of Miscellaneous Species

Other species trapped incidental to spring chinook include adult summer chinook, adult steelhead trout (Salmo gairdneri), and bull trout (Salvelinus malma) (Table 4). All of these fish were returned to Rapid River.

### **Red River**

During the period from July 10 to September 1, a total of 112 adults and 2 jacks were trapped in Red River. Of these, 29 adults and 2 jacks were released upstream from the weir to spawn naturally, with the remainder being hauled to Kamiah for holding and spawning.

### Holding and Spawning

To reduce prespawning mortality, all fish were given a single subcutaneous injection of erythromycin phosphate (2.2 mg per kg body weight) and any injuries were treated with a direct application of

**1984  
RAPID RIVER  
SPRING CHINOOK  
TRAP COUNT**

**RUN TOTAL = 2,356 FISH**

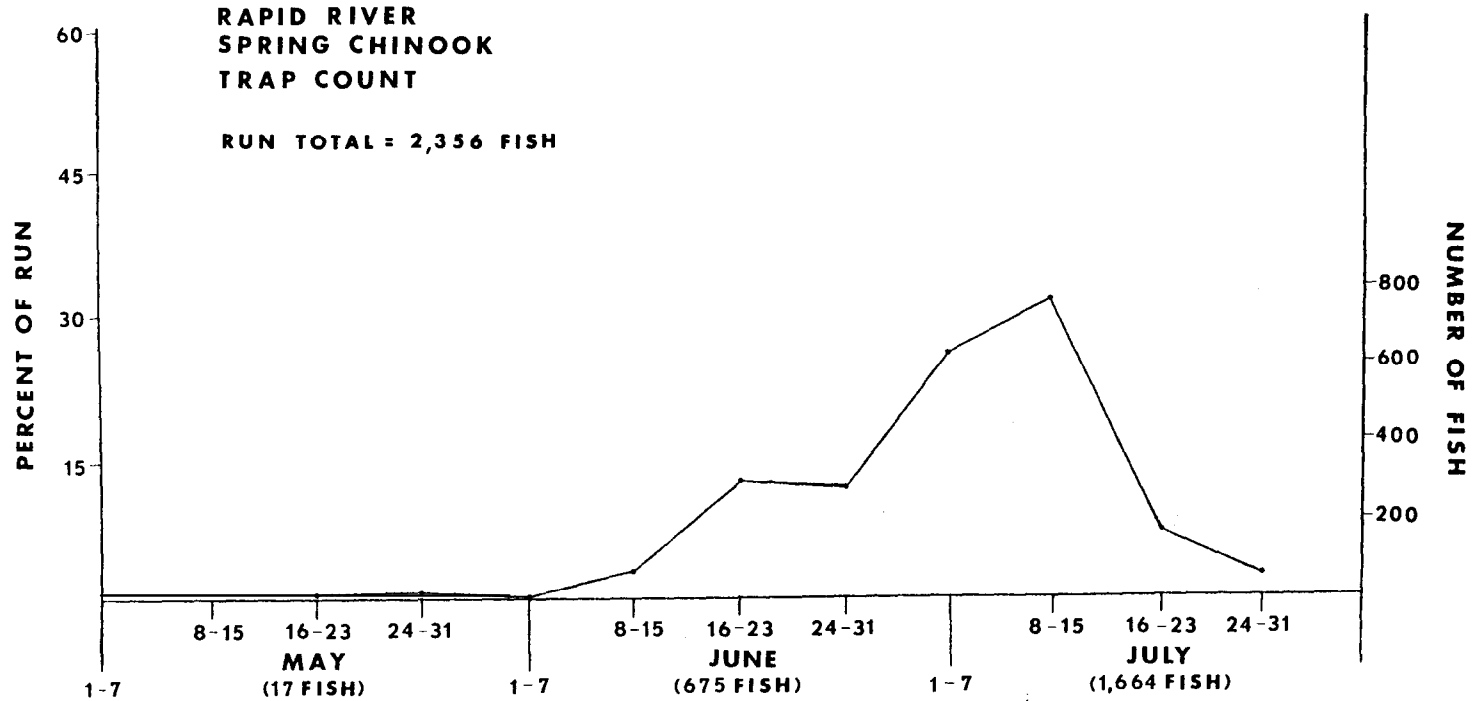


Figure 1. Timing of adult returns, 1984.

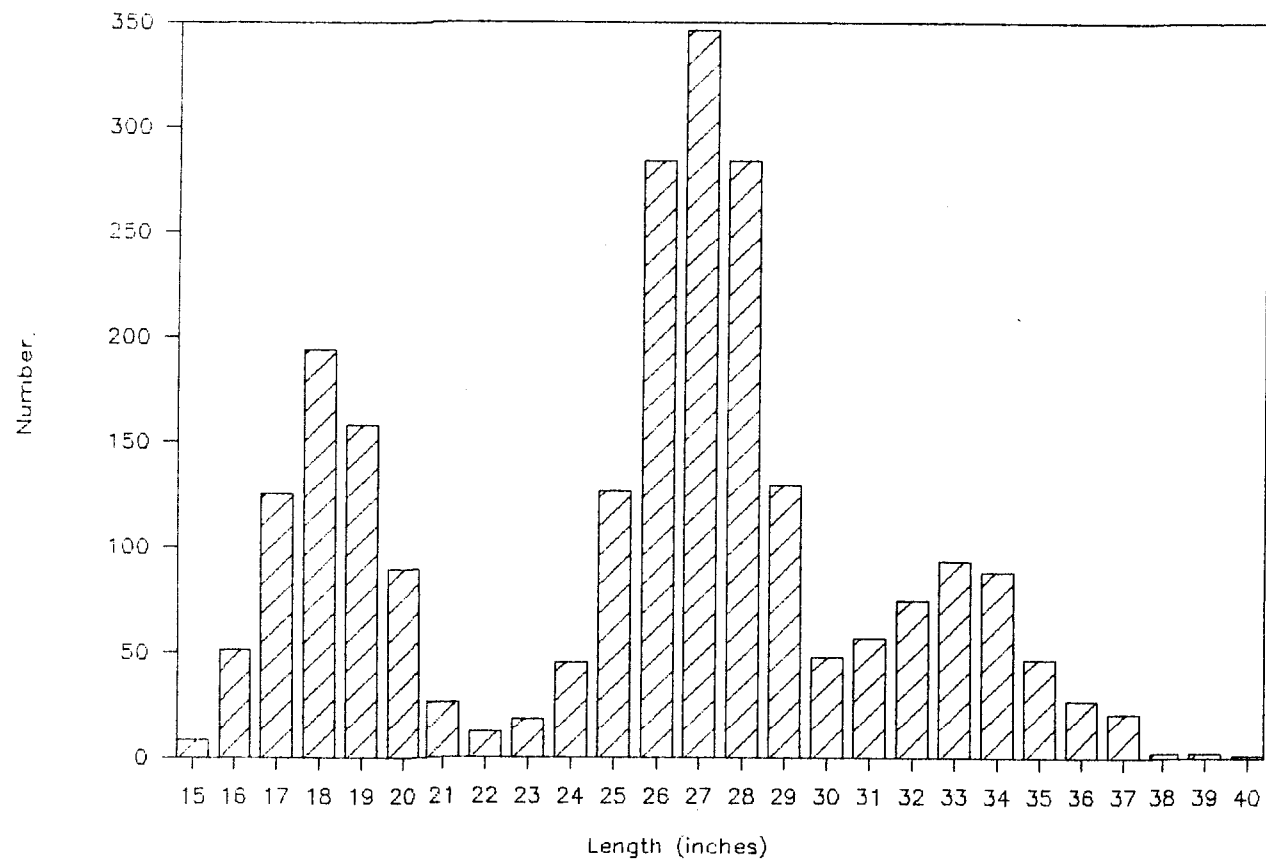


Figure 2. Length frequency of adult spring chinook, 1984.

a fungicide prior to transfer to the holding pond. To control fungal development and further reduce prespawning mortality, fish were treated with a fungicide every other day throughout the holding period.

Prespawning mortality, including 14 trap mortalities, totaled 50 males and 75 females (7.3% of the adult count). Autopsies performed on these fish revealed 28% (35 fish) to have apparent signs of bacterial kidney disease (BKD).

Spawning operations began on August 8 and continued through September 14, 1984. Eggs were taken dry and ovarian fluid removed to reduce the potential for vertical disease transmission. Sperm was also collected dry and pooled prior to fertilization. A total of 821 females were spawned. They yielded approximately 3,125,911 eggs. Average fecundity was 3,807 eggs per female. Aside from four experimental groups (see Special Studies), all eggs were water hardened in a 2 ppm solution of erythromycin phosphate for one hour before transfer to the incubators.

Due to the below normal egg take this season, no eggs were available for distribution to other projects. Salvageable carcasses, including 438 Jacks and 8 trap mortalities, were given to the Nez Perce Indians for distribution among tribal members. All fish treated with erythromycin phosphate and/or malachite green were destroyed.

## **Red River**

Forty-nine females were spawned yielding approximately 217,181 eggs. Average fecundity was 4,276 eggs per female.

## **Incubation**

After water hardening in erythromycin phosphate, eggs were sized using a 6" (15.24 cm) VonBayer trough and placed in Heath incubator trays. Loading density was approximately 80 fluid ounces (2,365.6 ml) per tray.

Beginning on the fourth day of incubation, all egg lots were treated with formalin to control fungal invasion. Treatments were administered three times per week at a 1:600 concentration for 15 minutes and continued until each lot accumulated 800 daily temperature units (TU).

Eye-up occurred at approximately 500 TU's, at which time all eggs were shocked and picked using the salt flotation method. Egg size was redetermined at this time by volumetric displacement, and the eggs were returned to the incubator trays. Survival to eye-up ranged from 61% to 91%, with an overall average of 82.1%. Hatching occurred at approx-

approximately 1,000 TU's, and swim-up fry were transferred to the raceways at 1,500 to 1,669 TU's. Survival from eye-up to swim-up averaged 98.7%.

## **Red River**

All eggs collected from Red River stock were transported to Rapid River Hatchery for incubation and early rearing. Survival to eye-up and swim-up was 75.5% and 99%, respectively.

### **Early Rearing**

During the period January 24 through April 3, a total of 2,570,199 swim-up fry were transferred to the outdoor raceways. Average size at the time of transfer was 1,305 per pound (2,877/kg). Loading densities ranged from 245,000 to 350,000 fish per raceway with an initial water depth of 1.5' (.46 m) and inflow of 0.9 cfs. As fish size increased, water depth and inflow were adjusted up to a maximum of 3' (.91 m) and 1.5 cfs to maintain density and flow indices at or below 0.5 and 1.5, respectively, as suggested by Piper et al. (1982).

All fish were fed Oregon Moist Pellet, Formula IV diet (OMP-IV) during the early rearing period. Feed was delivered using Allen automatic feeders with supplemental hand feeding done on an hourly basis. Fry were started on OMP starter mash at 2.5% body weight, with feed size increasing to 1/32" at 800 per pound and 3/64" at 500 per pound. As pellet size increased, feed delivery rates also increased up to 4% body weight. Pound counts were taken at two-week intervals and feed volumes adjusted accordingly.

Cold water temperature during February and March resulted in growth rates which were somewhat lower than expected. As water temperature rose above 40 F (4.4 C) in April and May, growth rates increased significantly, and followed a more normal pattern (Fig. 3). Mortality during this phase of rearing totaled 41,284 fry or 1.6%.

## **Red River**

Between January 24 and March 20, a group of 162,558 swim-up fry was transferred to the outside raceways at Rapid River Hatchery. Average size at this time was 1,170.58 fish per pound (2,580.7/kg). With all conditions being relatively equal, the Red River stock followed a growth pattern very similar to that observed in the Rapid River fry. Mortality during this period totaled 10,558 fry or 6.5%.

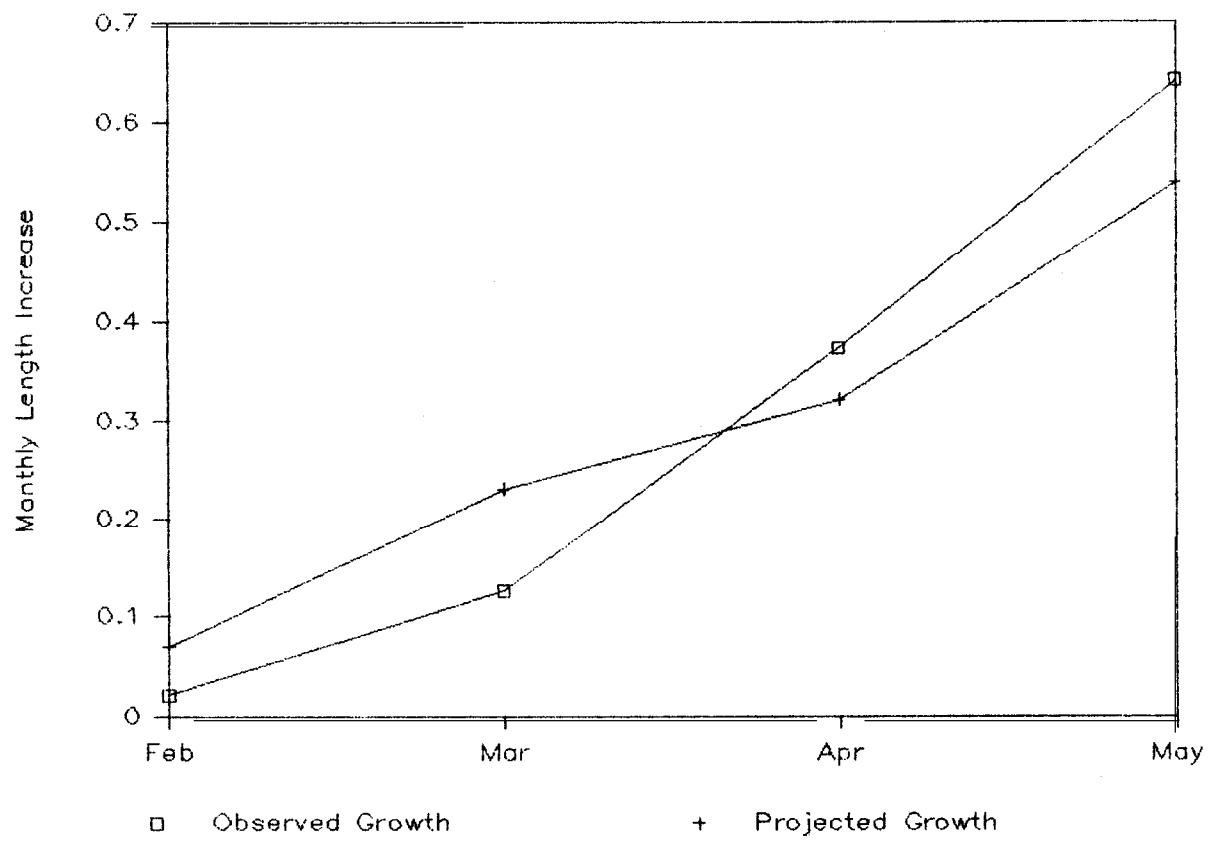


Figure 3. Observed and projected growth during early rearing.

### Final Rearing

By June 7, transfer of fry to the earthen rearing ponds was completed. Mean size at this time was 206.5 fish per pound (455.25/kg). Initial pond loadings are presented in Table 5.

All fish were fed OMP Formula II (OMP-II) during the final rearing period. Initially, 1/16" pellet size was used, with feed size increasing to 3/32" at 150 per pound and 1/8" at 50 per pound. Feed rates were maintained between 3.0 and 3.7% body weight throughout the summer. Pound counts were taken at two-week intervals and feed volumes adjusted accordingly. As water temperature decreased in September, feed rates were reduced to 2.0% and finally less than 1.0% during December and January.

Poor fish health during this period (see Fish Health) is reflected in inconsistent growth rates (Fig. 4). Total mortality during this period was 715,000 fish or 27.1%.

#### Red River

On June 26, all Red River fry were transferred by truck to Red River Pond. Average size at this time was 105 per pound (231.5/kg). At the time of transfer, a significant number of fry were observed with advanced symptoms of bacterial kidney disease. Therefore, a 21-day treatment of erythromycin thiocynate medicated feed was administered at 4.5 grams active ingredient per 100 pounds (45.3 kg) of fish per day. Due to excessively warm water temperatures in Red River during the summer months, feeding rates were maintained at reduced levels to avoid fish health problems. Consequently, moderately low growth rates were observed. Feeding was discontinued on October 10, with average fish size at that time being 31.5 per pound (69.4/kg). Mortality during the final rearing phase was estimated to be 10%.

### Special Studies

Two studies were conducted on the 1984 brood fish. The first study involved water hardening eggs in various concentrations of Argentyne. Four test groups and one control group were established. All eggs were collected from a single days' spawn take. Test groups were water hardened in various strengths of Argentyne ranging from 1:300 to 1:50 for 30 minutes. A control group was water hardened in erythromycin phosphate. After water hardening, all eggs were placed in Heath incubators. Eggs and fry were monitored throughout the incubation period and fry samples sent to laboratory personnel for bacteriological examination.

Table 3. Percent return on vibrio vaccination test groups.

Group	Brood year	% marked	% returns marked
Vibrio	1979	3.9	0.56
Control	1979	2.2	1.70
Vibrio	1980	2.8	0.80
Control	1980	2.8	1.20

Table 4. Fish collection incidental to spring chinook.

Species	Number trapped	Dates
Summer chinook	117 adults, 27 jacks	7-25 thru 8-21
Steelhead	61	4-27 thru 6-17
Bull trout	342	4-27 thru 9-10

Table 5. Initial pond loading densities, June 1985.

Pond	Inflow	Millions of fish	Size per pound	Flow index	Density index
1	13 cfs	1.2	262.6	.51	.05
2A	7 cfs	0.5	191.9	.51	.06
2B	7 cfs	0.2	166.0	.25	.03
2C	7 cfs	0.2	168.0	.27	.03
2D	7 cfs	0.5	184.9	.54	.06



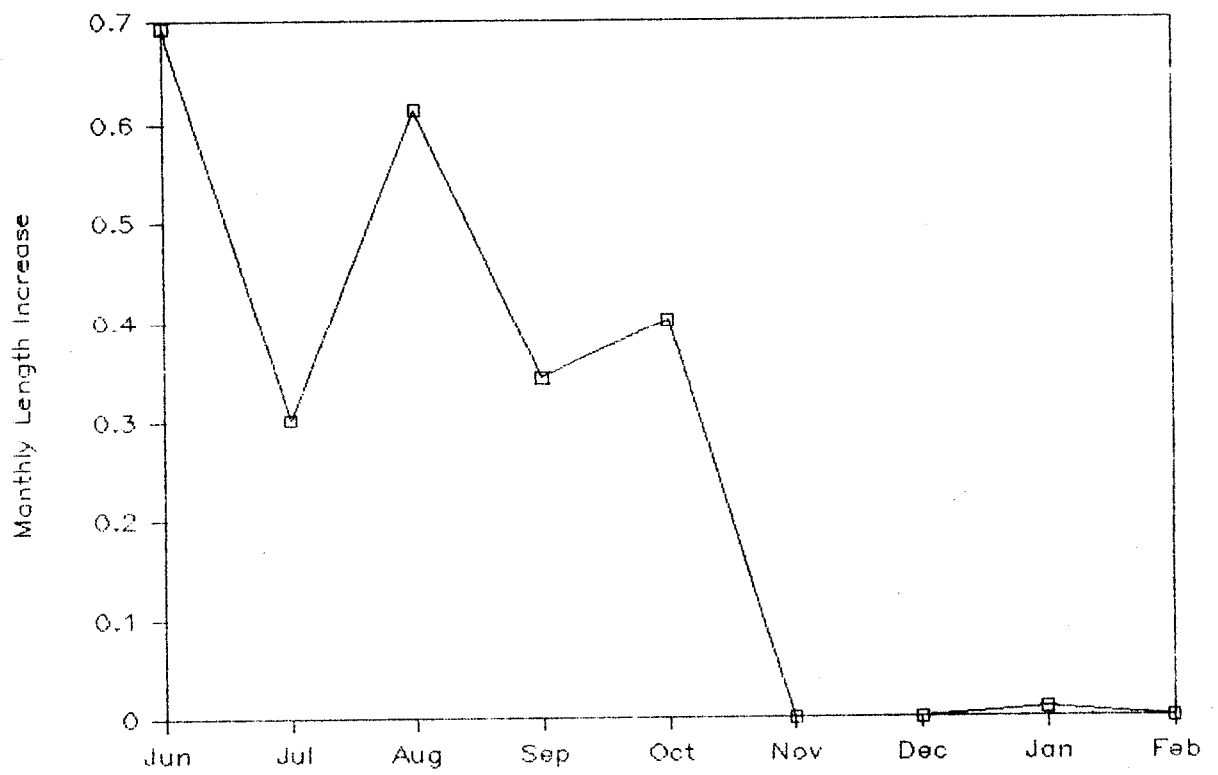


Figure 4. Observed growth at Rapid River during final rearing.

Eye-up percentage on test groups ranged from 86.3% (1:100 conc.), to 92.8% (1:50 conc.) with no significant trends or differences noted. Eye-up of the control group was 85.8%. Lab personnel found no significant difference in the number of bacteria observed between control and test groups.

The second study conducted on 1984 brood fry was designed to evaluate the benefits of feeding a diet of OMP-IV containing 10 times the normal amount of pantothenic acid. Two test groups and one control group were set up from a single fry lot. Both test groups received OMP-IV containing 10 times the normal amount of pantothenic acid, while the control group received the normal OMP-IV diet. All groups were fed hourly in relatively equal amounts during the 90-day test period. Comparisons of growth, mortality, and general fish health at the conclusion of the period showed no significant differences between control and test groups. However, feed samples analyzed for vitamin content were inconsistent with manufacturer's specifications, indicating either improper feed manufacture or poor vitamin retention during storage. In light of these inconsistencies, the study yielded no conclusion.

### Fish Health

Fish health during the early rearing period was very good. Routine necropsies conducted by hatchery personnel and Pat Chapman (IDFG Pathologist) turned up no significant abnormalities. During this time, prophylactic treatments were administered every two weeks using benzalkonium chloride at 2 ppm for one hour.

Fish health during the final rearing phase was quite poor. Fish were infected with bacterial kidney disease (BKD), enteric red mouth (ERM), bacterial gill disease, and cold water disease. Shortly after transfer to the rearing ponds, a chronic BKD infection developed. Initial mortality was low, and no control measures were taken. By mid-July, mortality had increased to nearly 200 fish per day. Samples collected on July 23, 25, and 27 confirmed the presence of BKD as well as ERM in both rearing ponds. Mortality remained above normal well into August, with a total loss of 10,000 fish attributed to BKD. Prophylactic treatments with benzalkonium chloride continued through August.

Mortality briefly returned to normal but once again began to increase in early September. This mortality was diagnosed as bacterial gill disease after examinations revealed gill hyperplasia and the presence of myxobacteria in moribund fish. Feeding was immediately discontinued and control measures initiated. Both ponds were treated with copper control at 303 ml/cfs for one hour, followed by three daily treatments of benzalkonium chloride at 3 ppm for one hour each. This series of treatments was again administered after a 3-day rest period with little or no effect. Treatments with potassium permanganate were also administered at 1 ppm, 0.5 ppm, and 0.25 ppm on consecutive days.

These treatments were continued alone and in combination until October 9, with little or no noticeable effect. As water temperature decreased in October, mortality returned to normal, and fish were gradually placed back on feed. Total mortality from bacterial gill disease was estimated at 45,000 fish.

During mid-October, hatchery personnel began observing fish with symptoms of cold water disease (necrotic tissue and fungal infections near the caudal peduncle). Records indicated that this was a common occurrence at Rapid River, and because of its chronic nature, posed no serious threat. This year, however, mortality from cold water disease rapidly increased to epidemic proportions. Beginning October 29, fish were placed on medicated feed containing sulfamerazine for 14 days. Feed rates were calculated to provide 4.54 grams of sulfamerazine (active ingredient) per 100 pounds (45.3 kg) of fish per day. Weekly treatments with malachite green were also administered at 1 ppm for one hour and continued through December. By January, mortality had returned to near normal. As water temperatures increased in February, mortality from cold water disease began to show up again. Mortality was effectively reduced by placing the fish on a 10-day diet of TM-50 (4 grams of Terramycin per 100 pounds [45.3 kg] of fish per day) and treating with malachite green at 1 ppm for one hour. Total mortality from cold water disease was estimated at nearly 300,000 fish.

Prior to release, smolts from both rearing ponds were sampled for bacterial and viral pathogens and underwent smolt quality assessment. Test results for all pathogens were negative with the exception of Renibacterium salmoninarum (Table 6). While data analysis is incomplete at this time, smolt quality at release appears to have been very good (Chapman, personal communication).

## **Red River**

While routine necropsies were not conducted on Red River stock, mortality was negligible, and fish health was felt to be very good. Smolts sampled during outmigration were in very good condition with virtually no descaling and large amounts of visceral fat present.

## **FISH DISTRIBUTION**

### **Fish Marking**

Approximately one month prior to release, a portion of the 1984 brood pre-smolts were marked for research purposes. An agreement was recently developed between the United States and Canada in which selected stocks of Idaho fish will be used as indicators of Idaho's contribution to ocean harvest. With Rapid River being one of these selected stocks, a large group of fish received a CWT and adipose fin

clip for identification. In addition, two groups of fish were freeze branded for evaluation of outmigration timing and survival. After marking, all fish were returned to the rearing ponds and released in conjunction with the normal hatchery production. A summary of marked groups is presented in Table 7.

### Smolt Release

By utilizing the CWT fish as a mark group, it was possible to estimate the total fish inventory at Rapid River Hatchery prior to release by developing a Lincoln-Peterson population estimate. Based on the results of this estimate, a total of 1,734,688 smolts were released from Rapid River Hatchery in 1986. This total includes 1,594,688 smolts released directly into Rapid River and 140,000 smolts released into the Snake River below Hells Canyon Dam. Smolts released directly into Rapid River averaged 22.0 per pound (48.5/kg) and 5.04" (128 mm) fork length, while smolts released into the Snake River averaged 20.0 per pound (44.1/kg) and 5.12" (130 mm) fork length.

### **Red River**

Pond screens were removed on October 4 to allow volitional release of the Red River fish. General observations indicated that very few of the pre-smolts emigrated during the fall. On April 4, 1986, the pond was drained, forcing out the majority of the smolts. An estimated total of 136,800 smolts were released at a mean size of 30 per pound (66.1/kg) and 4.32" (109.8 mm) fork length.

### **ECONOMICS**

A total of 129,000 pounds (58,513.4 kg) of feed were used to produce 79,486 pounds (36,054.2 kg) of fish this brood year. This resulted in an overall feed conversion of 1.62:1. Total feed cost for production of 1984 brood smolts was \$57,081.73 or \$0.7181 per pound (\$1.58 per kg) of fish produced.

### Red River

A total of 7,800 pounds (3,538 kg) of feed were used to produce 4,560 pounds (2,068.4 kg) of fish at Red River. The resulting feed conversion was 1.71:1. Total feed cost was \$3,329.82 or \$0.7302 per pound (\$1.61 per kg) of fish produced.

Table 6. Results of disease inspection of Rapid River presmolts.

Pathogen	Sample size	Results
IHN virus	60 kidney/spleens	negative
IPN virus	60 kidney/spleens	negative
EN virus	30 blood smears	negative
Other viruses	30 kidney/spleens	negative
<i>Yersinia ruckeri</i>	50 intestine streaks	negative
<i>Aeromonas salmonicida</i>	50 intestine streaks	negative
<i>Renibacterium salmoninarum</i>	66 kidney imprints	positive

Table 7. Summary of marked fish released from Rapid River, 1986.

Mark	Number marked	Size	Release group	Date	Location
LDY-3	44,754	20/1b	140,000	3/26-27	Snake R.
LDY-1	44,692	22/1b	1,063,126	4/4-7	Rapid R.
CWT	309,481	22/1b	1,063,126	4/4-7	Rapid R.

## RECOMMENDATIONS

### Fish Production

During the 1985 brood year, special attention will be given to development of a hatchery constant for calculation of feeding rates as well as a comparison of the dietary efficiency of OMP-I and OMP-IV during the final rearing cycle. We hope that research in these two areas will allow us to increase feed conversion as well as the quality of the smolts produced.

### Facility Improvements

Numerous improvements have been made in recent years to upgrade and improve hatchery operations. Consideration should be given to the following recommendations to further improve the overall operation of Rapid River Hatchery.

1. Modify the existing low water alarm systems.
2. Reconstruct the adult holding and spawning facilities to include concrete holding ponds and mechanical crowders.
3. Modify the water supply system to pond #2 to increase the available volume of water.

## ACKNOWLEDGEMENTS

The crew at Rapid River Hatchery would like to express their appreciation to Mr. Larry Wimer and the entire staff of Idaho Power Company for their continued support and assistance in making this one of the finest hatcheries in the Pacific Northwest. Special thanks also go to Rodney Duke and his crew, Pat Chapman, hatchery personnel from McCall and Oxbow hatcheries, enforcement personnel from Region 2, and the U.S. Forest Service Red River Ranger District.

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## APPENDICES

Appendix I. Returns of spring chinook salmon to Rapid River Hatchery, survival to spawning, and enumeration of eggs, 1964-1985.

Return ear	Snake R. returns (adults)	Rapid R. returns (adults)	Rapid R. returns (jacks)	Prespawning mortality percentage	Number of females spawned	Number of eggs per female	Number of eggs taken
1964	349			16%	182	4,874	887,000
1965	408			21%	133	4,541	604,000
1966	1,511			18%	621	3,697	2,296,000
1967	974		1,039	11%	581	3,537	2,055,000
1968	351	3,416	740	2%	1,809	3,671	6,540,000
1969	672	2,817	1,043	8%	1,415	3,655	5,151,697
1970		6,470	887	10%	3,520	4,136	14,560,280
1971		3,357	1,754	19%	1,722	3,507	6,038,785
1972		12,310	943	15%	3,825	3,941	15,072,604
1973		17,054	286	37%	3,454	3,912	13,510,465
1974		3,457	538	27%	1,756	3,924	6,890,186
1975		4,428	573	7%	2,184	3,894	8,503,606
1976		6,342	1,765	15%	3,055	3,762	11,492,878
1977		7,767	437	11%	3,781	3,745	14,160,330
1978		5,735	34	21%	2,350	4,266	10,026,888
1979		3,054	350	31%	1,141	4,950	5,648,722
1980		1,528	432	30%	543	3,235	1,756,827
1981		3,087	176	7%	1,666	3,675	6,122,273
1982		3,646	30	11%	1,883	3,973	7,482,330
1983		1,864	94	15%	859	4,015	3,449,471
1984		1,705	651	7%	821	3,807	3,125,911
1985		6,376	351	8%	2,962	3,741	11,082,369

\*In recent years, prespawning mortality included any female mortality prior to spawning and all male mortality up to two weeks after the beginning of egg taking operations.

Appendix II. Summary of spring chinook adults to Rapid River by brood year.

Brood Year	Year released	Number released	3 yr olds	Year returned	4 yr olds	Year returned	5 yr olds	Year returned	Total brood year return	% return from plant
1964	1966	588,000	1,039	1967	3,422	1968	197	1969	4,658	0.80
1965	1966-67	480,000	740	1968	2,620	1969	874	1970	4,234	0.89
1966	1968	1,460,000	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,000	887	1970	2,992	1971	1,544	1972	5,416	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,700	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,370	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	3,170,922	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,413,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,811,593	176	1981	3,089	1982	1,026	1983	4,291	0.15
1979	1981	2,520,045	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,473,733	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177.	1985		1986		
1982	1984	3,246,197	351	1985		1986		1987		
	1985	2,928,598								
	1986	1,734,688								

Appendix III. Summary of eggs, fingerlings and smolts planted from Rapid River Hatchery,  
1964-1983.

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1964 Brood:	887,000	eggs taken. No eggs, fingerlings, or smolts planted or transferred.
	580,000	smolts released into Rapid River, 1966. 22.6/lb.
1965 Brood:	604,000	eggs taken. No eggs, fingerlings, or smolts planted or transferred.
	480,000	smolts released into Rapid River, 1967. 23.2/lb.
1966 Brood:	2,296,000	eggs taken. No eggs, fingerlings or smolts planted or transferred.
	1,460,000	smolts released into Rapid River, 1967. 25.0/lb.
1967 Brood:	2,055,000	eggs taken. No eggs, fingerlings, or smolts planted or transferred.
	900,000	smolts released into Rapid River, 1969. 24.0/lb.
1968 Brood:	6,540,000	eggs taken.
	757,376	eyed eggs shipped to Clearwater River drainage hatching channels. No fingerlings or smolts planted or transferred. Nearly 2,000,000 smolt-sized fish were lost to Kidney Disease in early 1970.
	3,172,000	smolts released into Rapid River, 1970. 20.0/lb.
1969 Brood:	5,171,697	eggs taken.
	497,000	eyed eggs shipped to Dworshak Nat'l Hatchery to start Kooskia Nat'l Hatchery.
	4,300,000	eggs kept at Rapid River. No fingerlings planted or transferred, 1970.
	2,718,720	smolts released into Rapid River, 1971. 21.0/lb.

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Appendix III. Continued

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1970 Brood:	14,560,280	eggs taken.
	4,417,454	green eggs shipped to Sweetwater Eyeing Station for Clearwater reintroduction.
	2,224,119	green eggs shipped to Kooskia Nat'l Hatchery.
	526,516	green eggs shipped to Hayden Creek Hatchery.
	<u>2,473,983</u>	eyed eggs shipped to Clearwater River drainage hatching channels.
	9,642,072	eggs shipped.
	4,607,736	eggs kept at Rapid River.
Fingerling Plants, 1971:	200,520	planted in the Lemhi River.
	353,970	planted in Decker Pond.
	<u>100,000</u>	transferred to Sandpoint Hatchery.
	654,584	fingerlings planted or transferred.
Smolts Planted, 1972:	91,800	planted in the Lochsa River.
	2,809,200	released into Rapid River. 19.4/lb.
1971 Brood:	6,038,785	eggs taken.
	<u>600,496</u>	eyed eggs shipped to Hayden Creek Hatchery.
	5,438,289	eggs kept at Rapid River.
Fingerling Plants,	53,562	planted in the Lemhi River.
	104,300	planted in Red River.
	29,800	planted in Ten Mile Creek (Clearwater).
	44,700	planted in American River.
	14,900	planted in Papoose Creek.
	59,600	planted in Brushy Fork.
	44,700	planted in Fish Creek.
	14,900	planted in Post Office Creek.

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Appendix III. Continued.

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Fingerling Plants, 1972: (con't)	44,700 planted in Squaw Creek (Lochsa). 61,500 planted in Lochsa River. 60,000 planted in Ten Mile Creek (Clearwater). 200,880 transferred to Sandpoint Hatchery. 174,300 transferred to Decker Pond. 74,700 transferred to Decker Pond. <u>152,305</u> transferred to Decker Pond. 1,134,847 total fingerlings planted or transferred.
Smolt Plants, 1973:	197,303 planted in the South Fork of the Clearwater River drainage. 2,908,425 released into Rapid River. 17.0/lb.
1972 Brood:	15,072,604 eggs taken. 5,256,662 green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction). 1,881,024 green eggs shipped to Hayden Creek Hatchery. 1,131,334 eyed eggs shipped to Hayden Creek Hatchery. <u>1,293,592</u> eyed eggs shipped to Red River Hatching Channel. 9,562,612 total eggs shipped. 4,878,017 eggs kept at Rapid River.
Fingerling Plants, 1973:	None.
Smolt Plants, 1974:	None. 2,707,917 released into Rapid River. 17.5/lb.
1973 Brood:	13,510,464 eggs taken. 3,915,900 green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction). 1,295,424 green eggs shipped to Hayden Creek Hatchery. 104,760 green eggs shipped to Hagerman Hatchery. 502,200 eyed eggs shipped to Crooked River Hatching Channel.

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Appendix ill. Continued.

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1973 Brood (con't):	702,000	eyed eggs shipped to Kooskia National Hatchery.
	806,400	eyed eggs shipped to Hayden Creek Hatchery.
	<u>504,000</u>	eyed eggs shipped to Minnesota for walleye trade.
	7,830,684	total eggs shipped.
	5,302,677	eggs kept at Rapid River.
Fingerling Plants, 1974:	210,734	transferred to Sandpoint Hatchery.
	206,360	transferred to Kooskia National Hatchery.
	36,400	planted in Ten Mile Creek.
	52,080	planted in Ten Mile Creek.
	18,200	planted in Newsome Creek.
	633,000	planted in the Lemhi River.
	<u>10,428</u>	planted in Capehorn Creek.
	1,167,202	total fingerlings planted or transferred.
Smolt Plants, 1975:	117,000	planted in the S.F. of the Clearwater River.
	3,373,700	released into Rapid River. 14.8/lb.
1974 Brood:	6,890,186	eggs taken.
	809,400	eyed eggs shipped to Hayden Creek Hatchery.
	407,012	eyed eggs shipped to Indian Creek Hatching
	1,216,412	total eggs shipped.
	5,203,276	eggs kept at Rapid River.
Fingerling Plants, 1975:	203,500	transferred to Sandpoint Hatchery.
	21,840	planted in Capehorn Creek.
	59,962	planted in Red River.
	30,750	planted in Newsome Creek.
	10,250	planted in Ten Mile Creek.
	<u>1,140,300</u>	planted in the Lemhi River.
	1,466,602	fingerlings planted or transferred.
Smolt plants, 1976:	205,700	planted in the S.F. of the Clearwater River.
	3,564,640	released into Rapid River. 18.4/lb.

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Appendix III. Continued.

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1975 Brood:	8,503,606	eggs taken.
	2,363,200	green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction).
	252,200	eyed eggs shipped to Mullan Hatchery.
	255,000	eyed eggs shipped to Hayden Creek Hatchery.
	<u>280,659</u>	eyed eggs shipped to Indian Creek Hatching Channel.
	3,151,059	eggs shipped.
	4,906,492	kept at Rapid River.
Fingerling Plants,	34,000	planted in Ten Mile Creek.
	156,000	planted in the Lemhi River.
	65,960	planted in the S.F. of the Clearwater River.
	206,400	planted in Decker Pond.
	206,400	planted in Decker Pond.
	209,950	transferred to Sandpoint Hatchery.
	<u>36,143</u>	planted in Bear Valley Creek (upper Hayden Creek
	914,844	total fingerlings planted or transferred.
Smolt Plants, 1977:	249,750	planted in the S.F. of the Clearwater River.
	3,170,922	released into Rapid River. 15.9/lb.
1976 Brood:	11,492,878	eggs taken.
	1,161,608	green eggs shipped to Mullan Hatchery.
	2,937,994	green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction).

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Appendix III. Continued.

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1976 Brood (con't):	261,900	eyed eggs shipped to Hayden Creek Hatchery.
	261,900	eyed eggs shipped to Sandpoint Hatchery.
	<u>1,267,208</u>	eyed eggs shipped to Mackay Hatchery.
	6,344,610	total eggs shipped.
	5,009,482	kept at Rapid River.
Fingerling Plants, 1977:	47,008	shipped to the University of Idaho, Fisheries Co-op Unit.
	311,850	shipped to Mackay Hatchery.
	104,500	planted in Lolo Creek.
	501,600	transferred to Red River Pond.
	<u>80,600</u>	planted in the S.F. of the Clearwater River.
	1,045,558	fingerlings planted or transferred.
Smolt Plants, 1978:	None planted.	
	2,413,678	released into Rapid River. 15.7/lb.
1977 Brood:	14,160,330	eggs taken.
	2,633,400	green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction).
	2,287,800	green eggs shipped to Kooskia Nat'l Hatchery.
	2,439,000	green eggs shipped to Mullan Hatchery.
	250,200	eyed eggs shipped to Mullan Hatchery.
	288,000	eyed eggs shipped to Hayden Creek Hatchery.
	20,700	eyed eggs shipped to the University of Idaho.
	<u>1,007,340</u>	eyed eggs shipped to the Crooked River Hatching Channel.
	8,926,440	total eggs shipped.
	5,098,587	eggs kept at Rapid River.

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Appendix III. Continued.

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Fingerling Plants,	723,000	transferred to Mackay Hatchery.
	50,800	transferred to Decker Pond.
	200,025	transferred to Red River Pond.
	<u>265,600</u>	planted in the Lemhi River.
	1,239,425	total fingerlings transferred or planted.
Smolts Planted, 1979:	44,373	planted in Newsome Creek.
	<u>156,362</u>	planted in White Sands Creek.
	200,735	total smolts planted.
	3,018,448	released into Rapid River. 15.0/lb.
1978 Brood:	10,026,88	eggs taken.
	767,322	green eggs shipped to Hayden Creek Hatchery.
	970,728	green eggs shipped to Mackay Hatchery (500,000 eyed eggs to be
	1,540,282	green eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction).
	706,936	green eggs shipped to Dworshak Nat'l Hatchery.
	38,160	eyed eggs shipped to the University of Idaho.
	10,864	eyed eggs shipped to the University of Idaho (Hayden Creek).
	1,250,010	eyed eggs shipped to the Crooked River Hatching Channel.
	<u>249,969</u>	eyed eggs shipped to Sweetwater Eyeing Station (Clearwater reintroduction).
	5,534,271	total eggs shipped.
	4,219,846	eggs kept at Rapid River.

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Appendix III. Continued.

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Fingerling Plants, 1979: 232,500 transferred to Red River Pond.

10,000 planted in Ten Mile Creek.  
242,500 total fingerlings planted or transferred.

Smolts Planted, 1980: 157,440 planted in White Sands Creek.  
2,811,593 released into Rapid River. 15.0/lb.

1979 Brood: 5,646,722 eggs taken.  
806,400 eyed eggs shipped to Hayden Creek Hatchery.  
330,880 eyed eggs shipped to Dworshak Nat'l Hatchery.  
1,137,280 total eggs shipped.  
4,511,442 eggs kept at Rapid River.

Fingerling Plants, 1980: 293,240 planted in Red River Pond.

Smolt Plants, 1981: 1,001,700 planted in the Snake River at Hells Canyon Dam. 21.0/lb  
2,375,715 released into Rapid River. 17.9/lb.  
3,377,415 total smolts planted or released.

1980 Brood: 1,756,827 eggs taken.  
Fingerling Plants, 1981: None. no eggs shipped.

Smolt Plants, 1982: 1,473,733 released into Rapid River. 28.0/lb.

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Appendix III. Continued.

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981 Brood:	6,122,273	eggs taken.
	608,384	eyed eggs shipped to Pahsimeroi Hatchery.
	256,608	eyed eggs shipped to Oxbow Hatchery (Oregon).
	<u>449,280</u>	eyed eggs shipped to Dworshak Nat'l Hatchery.
	1,314,272	total eggs shipped.
	4,409,036	eggs kept at Rapid River.
ingerling Plants, 1982:	None.	
molt Plants, 1983:	2,998,103	released into Rapid River. 22/lb.
	<u>250,020</u>	planted in the Snake River at Hells Canyon Dam. 27/lb.
	3,248,123	total smolts planted or released.
982 Brood:	7,420,450	eggs taken.
	493,346	green eggs shipped to Lookingglass Hatchery (Oregon). These
		were later shipped to Dworshak National Hatchery
	1,332,000	
	375,028	eyed eggs shipped to Dworshak National
	<u>125,055</u>	eyed eggs shipped to Hagerman National
	2,325,429	total eggs shipped.
	4,614,863	eggs kept at Rapid River.
ingerling Plants, 1983:	306,000	transferred to Red River Pond. 255.0/lb.
molt Plants, 1984:	500,850	planted in Snake River at Hells Canyon. 27/lb.
983 Brood:	3,449,471	eggs taken and kept at Rapid River Hatchery.
		Due to the low number of eggs this year, no egg shipments were
		made to other projects.

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Appendix III. Continued.

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Fingerling Plants, 1984:	None	
Smolt Plants, 1985:	437,360	planted in Snake River at Hells Canyon Dam, 27/lb.
	2,491,23	released in Rapid River.
	<u>2,928,59</u>	total.
	8	
1984 Brood:	3,125,911	eggs taken at Rapid River.
	217,181	eggs taken at Red River.
	<u>3,343,09</u>	total.
	2	
Fingerling Plants, 1985:	152,000	transferred to Red River Pond, 105/lb.
Smolt Plants, 1986:	140,000	Snake River.
	1,594,68	Rapid River.
	136,800	Red River.
	<u>1,871,488</u>	total.

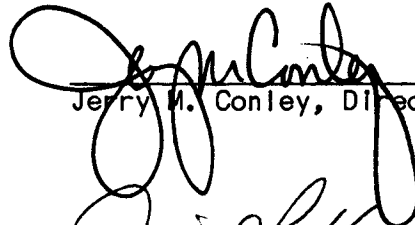
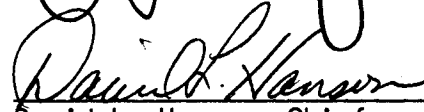
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